

CLAIMS

What is claimed is:

1. An apparatus comprising:
a first radiation source attached to a first gantry;
at least one second radiation source;
a second gantry that is rotatable; and
an imager attached to an articulable end of the second gantry.
2. The apparatus of claim 1, wherein at least one second radiation source is attached to the first gantry.
3. The apparatus of claim 1, wherein at least one second radiation source is attached to the second gantry.
4. The apparatus of claim 1, wherein the first radiation source is capable of propagating therapeutic energy.
5. The apparatus of claim 1, wherein at least one second radiation source is capable of propagating diagnostic energy.
6. The apparatus of claim 1, wherein the first gantry is rotatable.
7. The apparatus of claim 6, wherein the first gantry and the second gantry are rotatable about a common pivot axis.
8. The apparatus of claim 1, wherein the imager is a multiple-energy imaging unit.
9. The apparatus of claim 1, wherein the articulable end includes at least one pivot point between the second gantry and the imager.

10. The apparatus of claim 1, wherein the articulable end includes a sliding mechanism capable of translating the imager in a plane.
11. The apparatus of claim 1, wherein one of the at least one second radiation source is attached to a sliding mechanism capable of extending and retracting the second radiation source from the second gantry.
12. The apparatus of claim 1, wherein the articulable end is capable of folding the imager against the second gantry.
13. The apparatus of claim 7, wherein the second gantry is nestled within the first gantry.
14. A method for applying radiation, comprising:
 - positioning a diagnostic radiation source to be in alignment with a target volume;
 - positioning an imager to receive radiation from the diagnostic radiation source;
 - positioning a therapeutic radiation source to be in alignment with the target volume; and
 - re-positioning the imager to receive radiation from the therapeutic radiation source.
15. The method of claim 14, further comprising:
 - propagating the diagnostic radiation toward the target volume;
 - receiving the diagnostic radiation by the imager after passing through the target volume;
 - positioning the therapeutic radiation source is based on results of the diagnostic radiation to the imager;
 - propagating the therapeutic radiation into the target volume;
 - receiving the therapeutic radiation by the imager after passing through the target volume; and
 - generating verification data by the imager from the therapeutic radiation.

16. The method of claim 14, wherein the imager is a multiple-energy imaging unit.
17. The method of claim 14, further comprising; placing an internal seed to act as a marker for the target volume.
18. The method of claim 15, further comprising generating multiple diagnostic radiation slices using a fan X-ray beam to provide a 3-dimensional reconstruction of the target volume.
19. The method of claim 15, further comprising generating a cone X-ray beam where volumetric information can be constructed.
20. The method of claim 15, wherein the diagnostic radiation can be operated continuously to provide real time a fluoroscopic image of moving internal anatomy.
21. The method of claim 15, wherein the diagnostic radiation can be operated in a pulsed manner to provide a quasi-real time fluoroscopic image of moving internal anatomy.
22. A method for imaging radiation, comprising:
positioning a multiple-energy imaging unit normal to a first axis to receive radiation at a first energy level;
propagating radiation by a first radiation source at the first energy level along the first axis;
retracting the first radiation source and positioning a second radiation source along the first axis.
maintaining the multiple-energy imaging unit normal to the first axis to receive radiation by the second radiation source; and
propagating radiation by the second radiation source.

23. The method of claim 22, further comprising:
 - rotating the first radiation source until clear of the second radiation source;
 - extending the first radiation source to be in line with the multiple-energy imaging unit;
 - propagating radiation at a first energy level toward the multiple-energy imaging unit.
24. The method of claim 22, further comprising pivoting two arms independently, the first arm attached to the first radiation source for propagating at the first energy level, and the second arm attached to the second radiation source for propagating at the second energy level.
25. The method of claim 24, wherein the multiple-energy imaging unit is attached to the second arm.
26. An apparatus, comprising:
 - a therapeutic energy source attached to a first gantry;
 - a diagnostic energy source attached to a translatable end of a second gantry;
 - a multiple-energy imaging unit attached to an opposite articulable end of the second gantry;
 - the first gantry and the second gantry independently pivotable and attached at a common axis;
 - a patient couch capable of translation, wherein the result of such pivoting and translation is to place a target volume of a patient between the multiple-energy imaging unit aligned with the diagnostic energy source or the therapeutic energy source.